vidends from wood research

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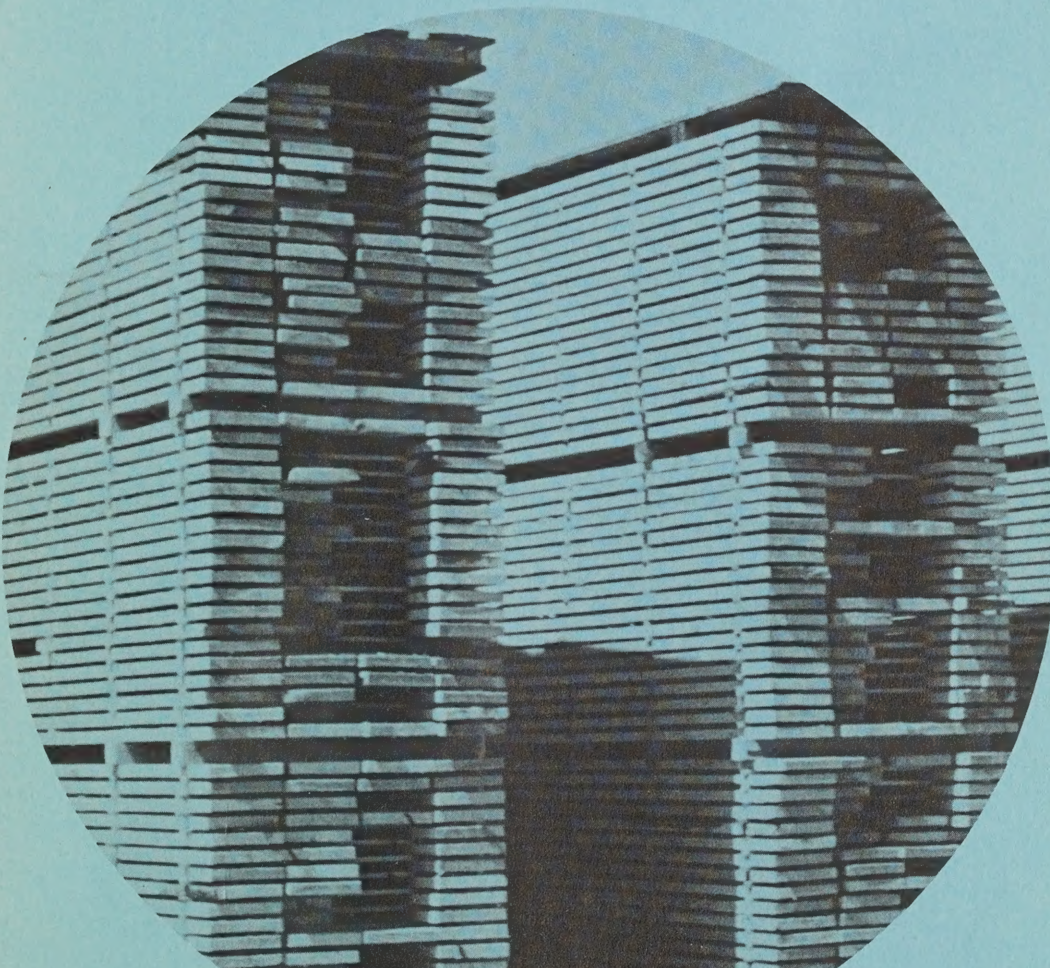

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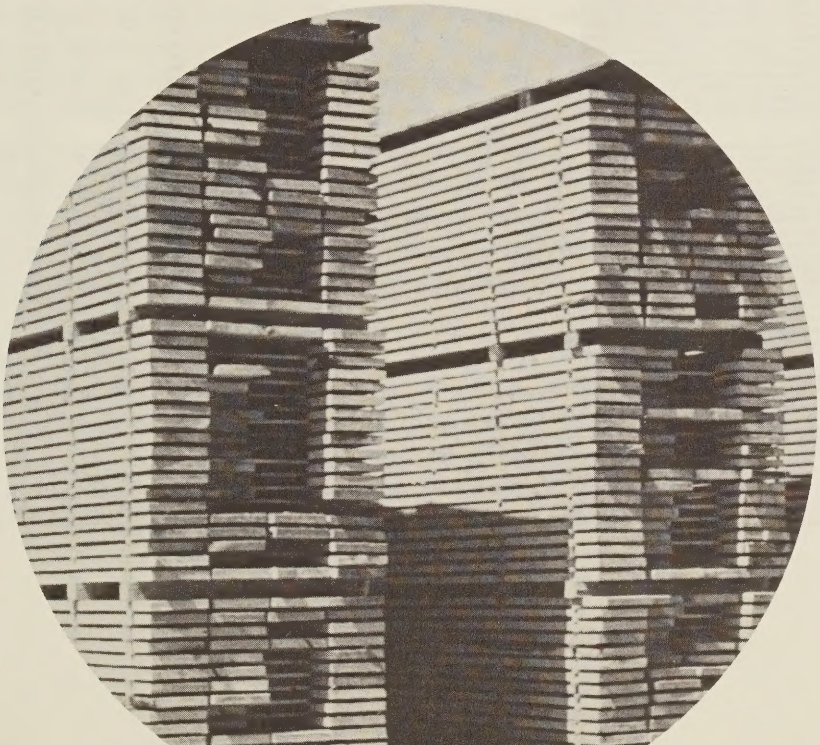
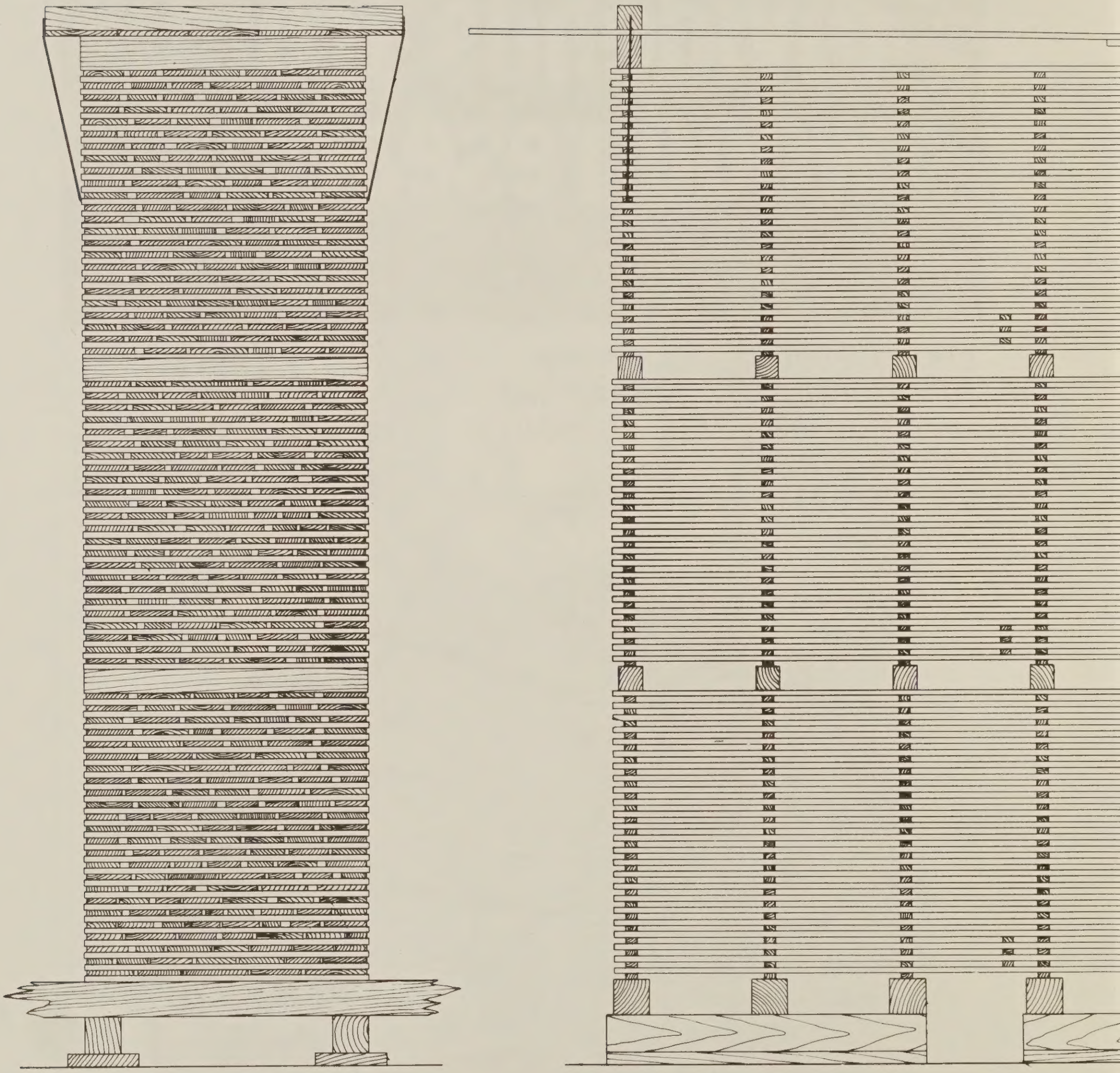




AIR DRYING OF LUMBER

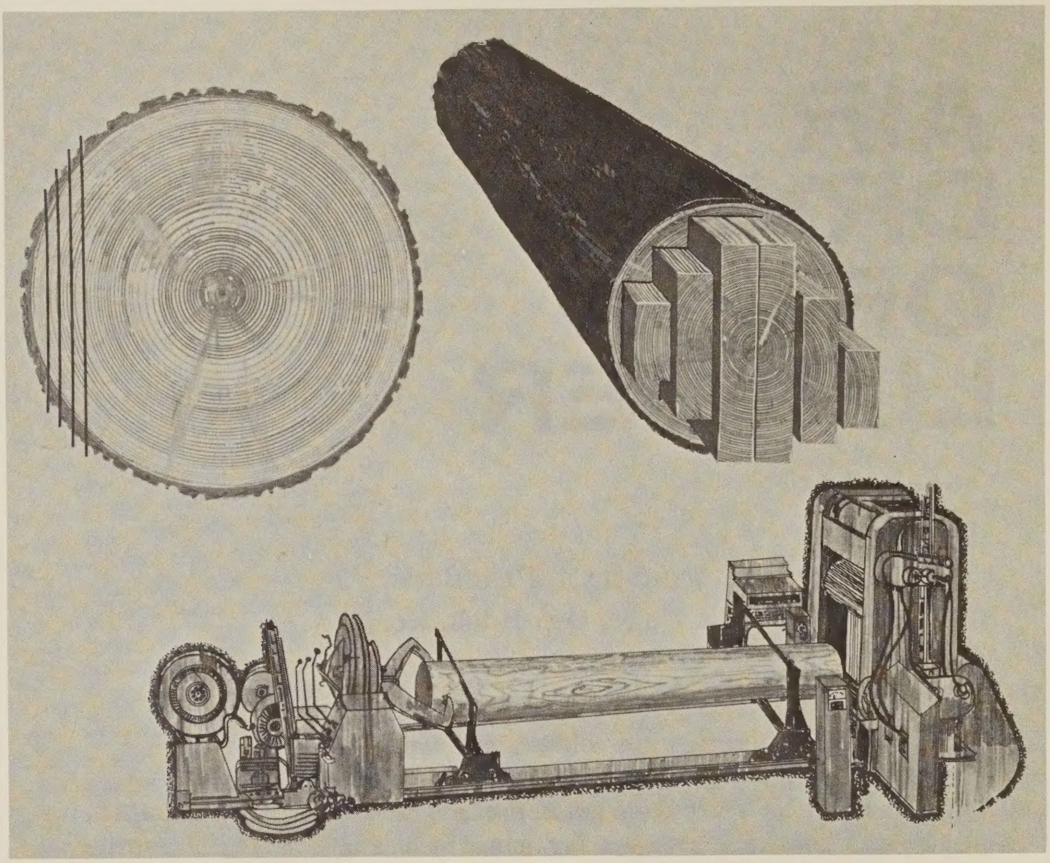
1 A Guide to Industry Practices, by R.C. Rietz and R.H. Page. Ag. Hdbk. No. 402, July 1971.

Air drying is perhaps the oldest, and for many purposes still the most economical, method of removing excess moisture from green lumber. Modern air drying, however, involves far more technology than simply piling lumber outdoors and letting nature take its course.

Today's mechanized handling methods, moreover, have introduced new technical problems. Successful air drying must take these into consideration.

Opening chapters cover the reasons for drying lumber and the basic wood technology involved, such as its structure, movement of moisture through wood, and the shrinkage that takes place as moisture is removed.

Other chapters deal with the basic air drying process, yard layout and drying pile design, sorting and piling methods, ways of avoiding fungal infection, chemical change, insect attack and other damage to lumber while it dries, cost factors, and protection of lumber.



INCREASING SOFTWOOD DIMENSION YIELD FROM SMALL LOGS

BEST OPENING FACE

2 by Hiram Hallock and David W. Lewis. USDA Forest Serv. Res. Pap. FPL 166. 1971.

BOF.

Along Broadway, that spells a hit--box office.

In sawmills, it may spell success of another kind--more lumber per log. It's an acronym for Best Opening Face. In essence, that means precisely locating the all-important first cut on a roughly cylindrical log to insure maximum production of square-edged lumber.

In a general way, sawyers have long known this. Only persistent research, however, coupled with the availability of lightning-fast computers, has produced a technique much more exact than sophisticated guesswork.

That's because the solution for a given log is affected by so many variables--size and shape of log, kerf width, sawmill precision capability, drying allowances, planing practice, etc. Only a properly programmed minicomputer, aided by an electronic scanner and precise log-positioning equipment, can exercise the necessary control.

The technique is designed for the smaller, mostly second-growth logs now sawn in most mills. Cost of equipment should be well under $100,000 for a medium-sized mill--one cutting 40,000 board feet or more a day.

ITEMS FOR FREE DISTRIBUTION are numbered and available from the Forest Products Laboratory while the supply lasts. To request publications simply circle the appropriate number on the back cover of this list, detach, and mail to the Laboratory. Blanket requests for publications cannot be filled.

Reports of slight interest to the general reader are designated "Highly technical."

OTHER RECENT FPL PUBLICATIONS

3 Wood Housing: A World-Wide Look, by H. O. Fleischer. Woodworking & Furn. Digest 73(10):28-30, Oct. 1971. Also Forest Prod. J. 21(12):12-13, Dec. 1971.

The world is in acute need of housing and forests can supply substantially more building materials than are now being used. Moreover, since forests are renewable, wood building materials do not represent the permanent drain on raw material resources as do many materials, and can be produced with less energy and less pollution. These are the conclusions of the World Consultation on the Use of Wood in Housing held July 5-16, 1971, at Vancouver, B.C.

4 WOOD in a Technological World, by H. O. Fleischer. So. Lumberman 223 (2776): 84-85, Dec. 15, 1971.

Wood technology has made remarkable strides during this century, with the development of industry standards, specifications, engineering criteria, grading rules, and processing and design standards based mainly on research. As a result, wood has emerged as perhaps our most versatile, if under-rated, raw material.

BOARD AND PANEL PRODUCTS

5 Reconstituted Products From Oak, by W. C. Lewis and B. G. Heebink. Oak Symposium Proc., USDA Forest Serv., Northeastern Forest Exp. Sta., Upper Darby, Pa., pp. 106-110, 1971.

"Reconstituted" describes a family of panel products made from fractionated oak, bonded with either a synthetic resin or a natural lignin bond. Several current commercial fiber panel products from oak are described, and the status of research on experimental products and processes is presented.

6 Board Materials From Wood Residues, by Wayne C. Lewis, USDA Forest Serv. Res. Note FPL-045, Rev. 1971.

Discusses manufacturing processes, effects of kind and form of raw material, economics of plant size, primary manufacture of fiber or particles, resin requirements, pressing, drying and curing equipment, and treatment after manufacture.

7 Simulated Service Testing of Wood and Wood-Base Finish Flooring, by Wayne C. Lewis. USDA Forest Serv. Res. Note FPL-0215, 1971.

Presents procedures for measuring resistance to concentrated loading, floor surface indentation from small-area loads or falling objects, and damage from rolling loads. Methods are presented for measuring abrasion resistance, coefficient of friction, and the effects of surface wetting.

CHIP STORAGE

8 Reliability of a Method for Measuring Specific Gravity to Determine Wood Losses in Outside Chip Storage, by W. E. Eslyn. Tappi 54(8):1269-1270, Aug. 1971.

The accuracy of a method used at the U.S. Forest Products Laboratory since 1959 for measuring specific gravity to determine losses of wood substance in outside stored pulpwood chips was recently assessed. Tests indicated that the results obtained by the method were well within tolerable limits of accuracy.

9 Encasing Wood Chip Piles in Plastic Membranes to Control Chip Deterioration, by W. C. Feist, E. L. Springer, and G. J. Hajny. Tappi 54(7):1140-1142, July 1971.

Degradation which occurs when wood chips are stored in large piles can be prevented by the exclusion of oxygen. Oxygen was successfully excluded from a small quaking aspen chip pile by covering the pile with a 20-mil-thick polyethylene film. (Highly technical)

10 Viability of Parenchyma Cells in Stored Green Wood, by W. C. Feist, E. L. Springer, and G. J. Hajny. Tappi 54(8): 1295-1297, 1971.

Respiration of living parenchyma cells is a major cause of initial heating in green pulpwood chip piles. At 21° C. living cells in fresh sapwood chips retain their viability up to 2 weeks. The living cells in fresh roundwood retain their viability for 2-3 months at 27° C., and for more than 8 months at 2° C. (Highly technical)

DESIGN

11 Timber Bridges Go Mod, by Roger Tuomi and Billy Bohannan. Wood Preserving 49(12):4-9, Dec. 1971.

Timber bridges are not structures of the past. They are highly economical structures for many applications, but have suffered from lack of developmental effort and a reputation for short service life. Advanced design concepts, such as glued-laminated components, and proper preservative treatment will make timber bridges more efficient structures in the future.

12 Flexural Properties of Glued-Laminated Southern Pine Beams--Finger Joint and Specific Gravity Effects, by R. C. Moody and Billy Bohannan. USDA Forest Serv. Res. Pap. FPL 151, 1971.

Results of research on large glued-laminated beams indicate that finger joints of adequate strength for outer tension laminations can be produced provided appropriate grading and quality control procedures are followed. Other results indicate that the use of specific gravity in addition to visual grading as a method of positioning laminations did not significantly affect beam strength and stiffness.

13 Bearing Strength of Wood Under Embedment Loading of Fasteners, by T. L. Wilkinson. USDA Forest Serv. Res. Pap. FPL 163, 1971.

The bearing resistance of wood to embedment loading of mechanical fasteners was investigated. Results show that loads at 0.05-inch embedment are related to the bearing area of the fastener and that maximum embedment load is related to the perimeter of the fastener head.

DRYING OF WOOD

14 Accelerating Oak Drying by Presurfacing, Accelerated Schedules, and Kiln Automation, by E. M. Wengert and R. C. Baltes. USDA Forest Serv. Res. Note FPL-0214, 1971.

Small-scale experiments in kiln drying were conducted using the process variables of presurfacing, kiln automation, and accelerated schedules. As a result of reduced drying times and minimal degrade observed, further testing on a larger scale appears justified.

15 Dry Kiln Automation, by E. M. Wengert. So. Lumberman 223(2776): 123-124, Dec. 15, 1971.

Status of dry kiln automation is reviewed and the outlook considered for automatically determining the moisture content of a load of lumber and programing and controlling kiln conditions.

16 Improvements in Solar Dry Kiln Design, by E. M. Wengert. USDA Forest Serv. Res. Note FPL-0212, 1971.

The areas of major heat losses in a solar dryer are identified. Modifications in design are suggested to reduce these losses and make a more efficient solar dryer.

17 Moisture Changes Induced in Red Oak by Transverse Stress, by William T. Simpson. Wood and Fiber, 3(1):13-21, Spring 1971.

The effect of stress on equilibrium moisture content (EMC) was investigated. Tensile stress was found to increase EMC while compressive stress decreased EMC. The size of the stress-induced change in moisture content approaches 1 pct. at high stress levels and high initial moisture contents, and increases in an approximately exponential way with initial moisture content.

FIBER PRODUCTS

18 Future Wood Needs for Papermaking Fibers Should Not Be a Problem, by R. J. Auchter. Paper Trade J. 155(34): 58-61, Aug. 23, 1971.

Growing mountains of solid waste and projected timber shortage challenge our technical competence and creativity to develop economical retrieval and recycle of wood and wood fiber from solid waste. Article discusses practical fundamentals of recycle and wastepaper use; recovery of wood fiber from urban solid waste, urban forestry, and forest residues; and pertinent research at the Forest Products Laboratory.

19 What's in the Wastepaper Fiber Collected from Municipal Trash, by G. C. Myers. Paper Trade J. 155(35):32-35, Aug. 30, 1971.

Information was obtained on quantity and quality of wastepaper in municipal refuse collected primarily from households. Eleven monthly samples showed that the fraction of paper remained near 47 pct. of the total milled waste. Pulp was 41 pct. groundwood and 59 pct. chemical, and strength of handsheets made with reused material was comparable to that from groundwood pulp.

20 Effect of Manufacturing Variables on Stability and Strength of Wet-Formed Hardboards, by P. E. Steinmetz and D. J. Fahey. USDA Forest Serv. Res. Pap. FPL 142, 1971.

Eight variables in the manufacture of high-density wet-formed hardboard were analyzed statistically to determine whether any one or certain combinations increased the strength and the dimensional stability of the boards. Wood species proved most important in increasing dimensional stability, while type of resin had greatest effect on strength and stiffness.

21 Predicting Flexural Stiffness of Corrugated Fiberboard, by J. W. Koning, Jr., and Russell C. Moody. Tappi 54(11): 1879-1881, Nov. 1971.

A method was developed to predict the flexural stiffness of corrugated fiberboard from the modulus of elasticity and moment of inertia of the component paperboards in the combined board. Calculated stiffness values for B-flute fiberboard differed from experimental values by 2 and 6 pct., and for an A-B-C triple-wall fiberboard by 3 and 5 pct.

22 Resistance of Resin-Impregnated Paper Overlays to Accelerated Weathering, by D. J. Fahey and D. S. Pierce. Forest Prod. J. 21(11):30-38, Nov. 1971.

Presents results of accelerated weathering of unpainted paper overlays from spruce kraft and sulfite pulps with varying amounts of urea, melamine, or phenolic resins. On Douglas-fir plywood, overlays with 30 pct. phenolic resin were in good condition after 46 weeks of exposure; others failed after 31 weeks unless treated with ammonium chromate.

23 The Effects of Humidity on Paper, by Von L. Byrd. Chem 26 Paper Processing 7(11):30-35, Nov. 1971.

Relative humidity affects the physical properties of paper by rupturing the hydrogen bonds that hold the structure together. In addition, cyclically wetting and drying paper while loaded is more harmful than keeping it wet.

24 Effect of Pulping on Cellulose Structure. Part I. A Hypothesis of Transformation of Fibrils, Part II. Fibrils Contract Longitudinally, by Volker E. Stockmann. Tappi 54(12):2033-2045, Dec. 1971.

The two reports examine the ultimate morphological unit of paper, the elementary fibril. Part I of this series hypothesizes a shortening of elementary fibrils during pulping and discusses how the shortening affects the fibrillar structure and the cell wall dimensions. The hypothesis breaks radically with the existing concept that envisions elementary fibrils as "iron rods"--stiff, brittle, and unyielding filaments. Suggesting a fibrillar contraction, Part II, by corollary, suggests that pulped fibrils should be capable of a maximum strain considerably above the present accepted value. (Highly technical)

25 Elementary Cellulose Fibrils Possess an Entropic Deformation Mechanism, by V. E. Stockmann. J. Polymer Sci., Part C. No. 36:363-381 (1971).

Elementary fibrils are the ultimate morphological units of any plant cell wall. The thermoelastic behavior of ramie fiber has been investigated to gain insight into the arrangement of cellulose molecules within fibrils. The data strongly suggest presence of disordered regions that are coupled in series to crystalline ranges. (Highly technical)

26 Oxygen/Alkali Oxidation of Cellulose and Model Alcohols and the Inhibition by Iodide, by J. L. Minor and Necmi Sanyer. J. Polymer Sci., Part C, No. 36:73-84 (1971).

The mechanism of carbohydrate degradation in oxygen delignifications is discussed and a new procedure for stabilizing polysaccharides by use of potassium iodide is presented. (Highly technical)

GRADING AND YIELD

27 Grading Hardwood Lumber by Computer, by Hiram Hallock and Lynn Galiger. USDA Forest Serv. Res. Pap. FPL 157, 1971.

Presents and explains a program which simulates the grading of hardwood lumber according to the rules of the National Hardwood Lumber Association. This is part of a larger overall system being developed to automate the decision-making process in hardwood sawmills. An unnumbered supplement to this publication contains the actual program listing.

28 Dimension Yields From Black Walnut Lumber, by David R. Schumann. USDA Forest Serv. Res. Pap. FPL 162, 1971.

Charts are presented for determining yields of dimension from the top four grades of walnut lumber. Yield and cost comparisons can be made of the various grades and grade mixes for the most economy with a specific cutting order. The basic chart for each grade is for random-width materials, with an adjustment for determining yields in other widths.

PACKAGING

29 Frequency Response, Damping, and Transmissibility Characteristics of Top-Loaded Corrugated Containers, by W. D. Godshall. USDA Forest Serv. Res. Pap. FPL 160, 1971.

Corrugated containers are frequently stacked to considerable heights. During transportation, stacks receive dynamic loading forces which, added to the weight of the stacked load, may cause the lower containers in the stack to fail. This cooperative study verified that stacks are sensitive to frequency range of vibrations likely to be encountered in common carrier transportation. Thus consideration must be given to these dynamic effects when selecting or designing corrugated containers.

30 How Variations in Corrugated-Pad Composition Affect Cushioning, by R. K. Stern. Package Eng. 16(7):50-53, July 1971.

The effect of component weight upon the shock-cushioning ability of corrugated fiberboard pads was evaluated for the range of loads commonly used. Cushioning ability remained essentially unchanged even though bearing area was reduced, if the weight of the components was increased. This permits similar shock absorption by pads of smaller bearing area.

31 Method for Recording Machine Speed at Which Corrugating Medium is Fluted, by J. W. Koning, Jr., and W. D. Godshall. USDA Forest Serv. Res. Note FPL-0216, 1971.

Modification of a commercial strip chart recorder resulted in a method for continuously marking the speed of an experimental singlefacer directly on the corrugating medium. This method improved the accuracy of determining the runnability--the speed at which fracture occurs--of various types of corrugating medium.

32 Wood Pallet Manufacturing, by Forest Products Laboratory. USDA Forest Serv. Res. Note FPL-0213, 1971.

Provides fundamental knowledge about wood, its characteristics, and fastenings as related to pallet design and production. Also discusses some of the factors affecting economics of pallet production and use.

PERFORMANCE OF WOOD IN FIRE

33 Usefulness of a New Method for Measuring Smoke Yield From Wood Species and Panel Products, by J. J. Brenden. Forest Prod. J. 21(12):22-28, Dec. 1971.

A new test apparatus and method for measuring the potential smoke development from building materials has been proposed by the National Bureau of Standards. This paper describes the FPL-built version of the equipment and method of operation at the Laboratory in determining the utility of the method. Potential smoke development was judged on 12 species of wood and 10 wood-base panel products under 3 levels of thermal irradiation and both flaming and nonflaming exposure.

34 Differential Calorimetric Analysis of Wood and Wood Components, by F. C. Beall. Wood Science and Tech. 5, pp. 159-175, 1971.

The thermal degradation characteristics of wood species, extracted and unextracted, and of components of wood (cellulose, hemicelluloses, and lignin preparations) were studied in a nitrogen atmosphere at 25° to 800° C. by differential calorimetric analysis. This technique indicates temperature ranges of maximum endothermic and exothermic peaks and the heat of pyrolysis within the temperature ranges. These data are basic to understanding the effect of the fire-retardant chemicals on the isolated wood components, and the selection of fire-retardant chemicals for optimum performance. (Highly technical)

PRESERVATION

35 Comparison of Wood Preservatives in Stake Tests (1971 Progress Report), by L. R. Gjovik and H. L. Davidson. USDA Forest Serv. Res. Note FPL-02, 1971.

Reports results on test stakes of southern pine sapwood treated by pressure and nonpressure processes and installed at various test sites since 1938. Evaluation treatments with creosote and petroleum oils, containing copper napthenate, zinc naphthenate, phenyl mercury oleate and penta, and waterborne preservatives are evaluated and compared.

36 Fifteen-Year Appraisal of Dip Treating for Protecting Exterior Woodwork: Effectiveness on Different Wood Species and in Various Climates, by T. C. Scheffer, A. F. Verrall, and Geo. Harvey. Material und Organismen 6. Bd. 1971. Heft. 1.

Serviceability of above-ground structures, such as post-rail units and flooring, was increased as a result of 3-minute dips in pentachlorophenol or copper naphthenate. Degree of protection afforded by chemical treatment varied with wood species and with the climate in which test structures were exposed.

PROPERTIES

37 Measuring Wood Surface Smoothness: Proposed Method, by C. Peters and A. Mergen. Forest Prod. J. 21(7):28-30, July 1971.

A precise method for measuring wood smoothness would be useful in laboratory, development, and manufacturing quality control. Because stylus tracing seemed the most suitable of the methods tried, a stylus tracing head was made specifically for wood surfaces. The complete system detected many degrees of roughness in trials.

38 Estimating Tree Specific Gravity of Major Pulpwood Species of Wisconsin, by D. Pronin. USDA Forest Serv. Res. Pap. FPL 161, 1971.

Relationship between the specific gravity of a breast-height increment core and that of the merchantable bole is expressed as a regression equation for nine wood species commercially important for pulpwood. These equations can be used to convert increment core data to estimates of the specific gravity of the bole.

WOOD CHEMISTRY

39 Bark and Its Possible Uses, by J. M. Harkin and J. W. Rowe. USDA Forest Serv. Res. Note FPL-091, 1971.

This review is designed to help lumber and wood pulp manufacturers dispose of waste bark harmlessly and profitably. Discusses bark structure and composition, past and present utilization, and methods of upgrading bark for increased utilization. Literature and bibliographic sources of information are indicated, as well as sources of technical assistance and equipment.

40 Correcting Absorption Errors in X-Ray Fluorescence Analyses of Preservative-Treated Wood, by D. F. Caulfield and R. A. Steffes. Wood Science 4(2): 106-113, Oct. 1971.

Errors caused by interelement absorption can be appreciable in the X-ray fluorescence analysis of arsenic, copper, and chromium in treated wood. A simple regression procedure is demonstrated that significantly improves the accuracy of analyses. (Highly technical)

41 Delignifying Aspen Wood With Aqueous Xylenesulfonic Acid at 100° C., by E. L. Springer and L. L. Zoch, Jr. Tappi 54(12):2059-2060, Dec. 1971.

It was possible to delignify finely divided aspen wood with a 2.0M solution of xylenesulfonic acid at 100° C. In just 1 hour cooking time a residue was obtained in 54.5 pct. yield, containing 5.6 pct. lignin. The cellulose had not been severely degraded, and the residue contained less xylan than conventional pulps. (Highly technical)

42 Demethylation and Ortho-Quinone Formation in Enzymic Dehydrogenation of Lignin Model Phenols, by W. J. Connors, J. S. Ayers, K. V. Sarkanen, and J. S. Gratzl. Tappi 54(8):1284-1288, Aug. 1971.

The dehydrogenation reactions of disyringylmethane have been clarified and the postulated main reaction sequence from methylene to carbinol to carbonyl confirmed. Significant side reactions leading to side chain cleavage and quinone formation were discovered. This suggests new possibilities for lignin alteration as a consequence of radiation or biological degradation. (Highly technical)

43 Derivatives of Nordehydroabietane From Pine Bark, by J. W. Rowe, B. A. Nagasampagi, A. W. Burgstahler, and J. W. Fitzsimmons. Phytochemistry 10:1647-1651, 1971.

During examination of the terpenoid extractives of the bark of jack and western white pine bark, several related new natural products were isolated with the same skeleton. These appear to be nonenzymatic products produced by oxidation of dehydroabietic acid or a closely related derivative. (Highly technical)

44 Determining Loss of Wood Substance After Fungal Attack: A Comparison of Two Methods, by W. C. Feist, W. E. Eslyn, E. L. Springer, and G. J. Hajny. Tappi 54(8):1271-1273, Aug. 1971.

Loss of wood substance after fungal attack was determined on the same sample by two methods: direct weighing and specific gravity loss. The two methods gave equivalent results after water-soluble extractives produced by the fungi were removed from the decayed wood by water soaking. (Highly technical)

45 Isolation and Characterization of 2-Guaiaconic Acid and the Nature of Guaiacum Blue, by J. F. Kratochvil, R. H. Burris, M. K. Seikel, and J. M. Harkin. Phytochemistry 10(10):2529-2531, 1971.

An ethanolic tincture of gum guaiac is used extensively, especially in mycology, for detecting phenol-oxidizing enzymes by formation of a blue pigment. The active principal in the resin was isolated and its structure and that of the blue pigment were elucidated. (Highly technical)

46 Mass Spectra of Diterpene Resin Acid Methyl Esters, by T-L. Chang, T. E. Mead, and D. F. Zinkel. J. Amer. Oil Chem. Soc. 48(9):455-461, 1971.

The mass spectra of a large number of tricyclic diterpene resin acids were studied. The fragmentation patterns observed are useful in studying and identifying the individual components of rosins. (Highly technical)

47 New Labdane Resin Acids From *Pinus Elliottii*, by B. P. Spalding, D. F. Zinkel, and D. R. Roberts. Phytochemistry 10(12):3289-3292, 1971.

Slash pine needles and cortex oleoresin have been found to contain a new and major diterpene constituent, imbricataloic acid. The closely related imbricatolonic acid, previously reported only in *Araucaria imbricata*, was present in small amounts in slash pine needle extract. Spectral data are given for an unidentified diterpene alcohol isolated from the cortex oleoresin. (Highly technical)

48 Oxidative Alkaline Degradation III: Stopping Reaction, by R. M. Rowell. Canad. Pulp and Paper Assoc. Tech. Section 72(7):T236-T239, July 1971.

Using cellobiose as a model compound for cellulose, the relative importance of the alkaline stopping reaction in oxidative and nonoxidative aqueous alkali was determined. Under nonoxidative conditions, cellobiose was totally degraded by the peeling reaction to monomeric units. In oxygen, glucosyl-aldonic acids were formed in yields up to 27 pct. (Highly technical)

49 Phenolics of Quercus Rubra Wood, by M. K. Seikel, F. D. Hostettler, and G. J. Niemann. Phytochemistry 10:2249-2251, 1971.

A method was developed for two-dimensional paper chromatographic charting of extractives of sapwood and heartwood of northern red oak. Many tannin compounds are present. Sixteen compounds were positively identified; seven of these had not been previously reported in oaks. The structure of one of these compounds, lyoniside, was determined. (Highly technical)

50 Strobic Acid, a New Resin Acid From Pinus Strobus, by D. F. Zinkel and B. P. Spalding. Tetrahedron Lett. 27: 2459-2462, 1971.

This preliminary communication describes the isolation and determination of the principal chemical and structural characteristics for a new diterpene resin acid found in needles and cortex of eastern white pine. The unusual structural feature of this resin acid is of particular interest in the physiology and biochemistry of resin production. (Highly technical)

WOOD AND DECAY

51 A Climate Index for Estimating Potential for Decay in Wood Structures Above Ground, by T. C. Scheffer. Forest Prod. J. 21(10):25-31, Oct. 1971.

Decay of wood is considerably affected by climatic conditions, hence the relative needs in different climates of protective measures for wood may vary considerably. To estimate these needs a quantitative measure of the relative potential of a climate to promote decay of above-ground wood structures exposed to the weather was developed.

52 Notes on Eight Species of Coprinus of the Yukon Territory and Adjacent Alaska, by Roy Watling and Orson K. Miller, Jr. Can. J. Botany 49, pp. 1687-1690, 1971.

Eight species of Coprinus, including C. atramentarius, C. comatus, C. exstinctorius, C. micaceus, C. narcoticus, C. patouillardii, C. radians, and C. subimpatiens are recorded from the St. Elias Mountains and near Klaune Lake in the Yukon Territory, the Skolai Pass in the Alaskan Range, and the vicinity of Juneau, Alaska.

53 Acid Degradation of Lignin-IV. Analysis of Lignin Acidolysis Products by Gas Chromatography, Using Trimethylsilyl Derivatives, by K. Lundquist and T. K. Kirk. Acta Chem. Scand. 25(3):889-894, 1971.

A simplified and rapid procedure is described to analyze products formed on the acid degradation of lignin. Analysis of these products is a powerful technique for characterizing the complex substances and determining chemical changes caused by various treatments such as micro-organism attack and pulping. (Highly technical)

54 Effects of Microorganisms on Lignin, by T. Kent Kirk. Ann. Review of Phytopathology 9, pp. 185-210, 1971.

Lignin is a complex, major component of wood that is resistant to breakdown by most organisms. Some micro-organisms, however, are capable of decomposing lignin. The literature dealing with the identity of the various micro-organisms involved and their specific effects upon lignin are summarized and evaluated. (Highly technical)

WOOD STRUCTURE

55 Particles and Microtubules in Vascular Cells of Pinus Strobus L. During Cell Wall Formation, by Lidija Murmanis. New Phytologist 70:1089-1093. Nov. 1971.

Particles in the plasmalemma-cell wall area are reported in fixed and sectioned material of differentiating vascular cells of Pinus strobus L. The particles, from 13 nm to 16 nm in diameter, arise from the superficial layer of cytoplasm and reach the plasmalemma-cell wall area apparently by a "membrane flow." Frequently the particles are in close spatial association with microtubules at the plasmalemma-cell wall area. The particles observed here are thought identical with those observed on the outer surface of plasmalemma by the freeze-etching method. (Highly technical)

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